

CLAIMS

1. Computer card for electro-pneumatic calibrators with system management inserted in a rigid material case in which are installed all of its components, connected to an electric power source and a relay, having in its front part a liquid crystal display and keys for entering data to its internal systems, characterized by presenting a Microchip Controller MCT (2) storing the equipment programs and receiving information from the keyboard (3), the SPR pressure sensor (9) and the SPC pressure sensor (10), the temperature sensor STE (11), the modem MOD (not shown, connected to the Serial Output) and the mechanical enabling key (7), with said Microchip Controller MCT (2) being able to control the operation of the solenoid valves for inflating with air, inflating with N<sub>2</sub>, deflating the tire, plus the solenoid valves for the compressor, purge valve, water-AGU output (22), vacuum cleaner-VAC output (23), electric heater-RST output, Alarm-ALA output (14), modem-MOD output and LCD display (8a, 8b).

2. Computer card for electro-pneumatic calibrators with system management according to claim 1, characterized by the fact that the Microchip Controller MCT (2) transmits information to the LCD display (8a, 8b), before, during and after the calibration operation, with displaying of previously defined messages.

3. Computer card for electro-pneumatic calibrators with system management according to claims 1 and 2, characterized by the fact that the Microchip Controller MCT (2) receives data from the temperature sensor (11) and exhibits it on LCD display (8a, 8b).

4. Computer card for electro-pneumatic calibrators with system management according to claims 1, 2 and 3 and characterized by the fact that the Microchip Controller MCT (2) commands the activation of the RST heater for protection of the LCD display (8a, 8b) against the damaging effects of low temperatures.

5. Computer card for electro-pneumatic calibrators with system management according to claims 1, 2, 3, and 4 characterized by the fact that the Microchip Controller MCT

(2) receive data from the time clock (17, 17a) and suggest the preventive maintenance work of the equipment and the replacement of spare parts on the same LCD display (8a, 8b).

5 6. Computer card for electro-pneumatic calibrators with system management according to claims 1 and 2 characterized by the fact that the Microchip Controller MCT (2) connected to a sensor or special buoy interprets or detects the level or conditions of the compressor oil, and if necessary, 10 interrupts immediately its operation, exhibiting a message on the LCD display (8a, 8b) and turning itself off.

15 7. Computer card for electro-pneumatic calibrators with system management according to claims 1 and 2 characterized by the fact that the Microchip Controller MCT (2) upon entering the emergency mode instantly opens the tire deflating valve (18), also interrupting other actions which are 20 being performed, exhibiting a message on the LCD display (8a, 8b) and sounding the Alarm ALA (14).

25 8. Computer card for electro-pneumatic calibrators with system management according to claims 1, 2 and 7 characterized by the fact that the Microchip Controller MCT (2) checks on every operation the current pressure interrupting the use in case it identifies a reading which is incompatible with those actions previously executed.

30 9. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 5 and 8 characterized by the fact that the Microchip Controller MCT checks and accepts the new zero reference for pressure inside those limits set every time it is used (auto-reset), and interrupts the operation in case the values are out of these preset limits (message AUTO-RESET ERROR).

35 10. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2 and 3 characterized by the fact that the Microchip Controller MCT controls a purge valve, both on the compressor tank and on filters, dryers, condensed separators or air networks.

11. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 8, and 9 characterized by the fact that the Microchip Controller MCT manages and turns on and

off the compressor according to preset values or letting the system calculate the operational pressure limits, expanding the service life and saving energy.

5 12. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 7, 8, 9, and 11 characterized by incorporating a third safety valve.

10 13. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 and characterized by incorporating a second LCD display, along with a second screen and set of keys placed on the back of the equipment, forming a double-faced model.

15 14. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 and 13 characterized by incorporating a serial communication port (data input and output) to receive and transmit data to a modem to be operated remotely, or a printer or even an infra-red sensor, also liberating the operation and fixing errors, if necessary.

20 15. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 7, 8, 9, 12, 13 and 14 characterized by allowing the entering of an overpressure value, for the calibration of large tires ("closing talon").

25 16. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 and 15 characterized by incorporating a special key for emergency EME (3) to be activated by hardware.

30 17. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 16 characterized by presenting a relay (24) that disconnects the energy supply of the equipment and activates the deflating valve every time the emergency EME (3) key is pressed.

35 18. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 and 17 characterized by incorporate the converter of voltage into frequency (15) component instead of the usual AD converters.

19. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 20, 11, 12, 13, 14, 15, 16, 17 and 18 characterized by the fact that the Microchip Controller MCT activates and monitors the tire 5 inflating/deflating system through the insertion of coins in the equipment.

20. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 3, 4, 13, 14, and 19 characterized by the fact that the Microchip Controller MCT 10 identifies the insertion of coins and activates the water pump, the opening valve and the closing valve of the water supply-AGV.

21. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 3, 4, 13, 14, 19 and 20 characterized by the fact that the Microchip Controller MCT 15 activates the solenoid valves to open and close the vacuum supply VAC (vacuum cleaning), by means of the insertion of coins into the equipment.

22. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 3, 4, 13, 14, 19, 20 and 21 characterized by the fact that the Microchip Controller MCT 20 identifies the insertion of coins, activates and monitors the detergent supply system.

23. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 25 12, 13, 14, 15, 16, 17 and 18 characterized by the fact that the Microchip Controller MCT activates and monitors the nitrogen supply system.

24. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 30 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 and 23 characterized by the fact that the Microchip Controller MCT incorporates counters and totalizers for coins, per operation, per kind of function used and general.

25. Electronic circuit for electro-pneumatic 35 calibrator according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24 and

characterized by the fact that the totals have a unique password for checking its exactness and authenticity.

26. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 7, 8, 9, 10, 11, 12, 13, 14, 5 15, 16, 17, 18, 19, 23, 24 and 25 characterized by the fact that the Microchip Controller MCT can detect at any time if the tire is or not connected correctly to the equipment.

27. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 7, 8, 9, 10, 11, 12, 13, 14, 10 15, 16, 17, 18, 19, 23, 24, 25 and 26 characterized by the fact that the Microchip Controller MCT, during the process of inflating or deflating of the tire, detects possible leaks (pressure losses) in the line.

28. Electronic circuit for electro-pneumatic 15 calibrator according to claims 1, 2, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 23, 24, 25, 26 and 27 characterized by the fact that it checks if the system is connected to the tires without harm for the auto-reset.

29. Electronic circuit for electro-pneumatic 20 calibrator according to claims 1, 2, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 23, 24, 25, 26, 27 and 28 characterized by the fact that the Microchip Controller MCT processes the internal routine of only initiating the process of inflating or deflating the tire, after it verifies that the line to be pressurized (equipment-tire) is completely stabilized, presenting an Error 25 message in case the pressure on the hose that reaches the tire does not become stable after a given period of time.

30. Electronic circuit for electro-pneumatic 27 calibrator according to claims 1, 2, 7, 8, 9, 10, 11, 12, 13, 14, 30 15, 16, 17, 18, 19, 23, 24, 25, 26, 27 and 28 characterized by the fact that the Microchip Controller MCT calculates the stabilization velocity of the current pressure and compares it to the standard minimum velocity, certifying that the line pressure is stable.

35 31. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 23, 24, 25, 26, 27, 28, 29 and 30

characterized by being able to exhibit on the display the estimated time for finishing the inflating or deflating of the tire, updated on every pulse.

32. Electronic circuit for electro-pneumatic  
5 calibrator according to claims 1, 2, 7, 8, 9, 10, 11, 12, 13, 14,  
15, 16, 17, 18, 19, 23, 24, 25, 26, 27, 28, 29, 30 and 31  
characterized by the fact that the Microchip Controller MCT stores  
internally standard pressure limits (minimum and maximum),  
previously set for each type of installation of the equipment  
10 (bicycle shop, service station, airport, among others).

33. Electronic circuit for electro-pneumatic  
calibrator according to claims 1, 2, 7, 8, 9, 10, 11, 12, 13, 14,  
15, 16, 17, 18, 19, 23, 24, 25, 26, 27, 28, 29, 30, 31, and 32  
characterized by the fact that the Microchip Controller MCT may  
15 receive changes of the minimum and maximum pressure limits, via  
keyboard, by an authorized person, by means of a password.

34. Electronic circuit for electro-pneumatic  
calibrator according to claims 1, 2, 7, 8, 9, 10, 11, 12, 13, 14,  
15, 16, 17, 18, 19, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32 and 33  
20 characterized by the fact that the Microchip Controller MCT  
automatically calculates the minimum reliable pressure pulse in  
order to later on calculate the total inflating/deflating time of  
the tire.

35. Electronic circuit for electro-pneumatic  
25 calibrator according to claims 1, 2, 7, 8, 9, 10, 11, 12, 13, 14,  
15, 16, 17, 18, 19, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33  
and 34 characterized by the fact that the Microchip Controller MCT  
enters the Stand By mode after 11" and 30" without use or if no key  
is pressed.

30 36. Electronic circuit for electro-pneumatic  
calibrator according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11,  
12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27,  
28, 29, 30, 31, 32, 33, 34 and 35 characterized by the fact that  
35 the Microchip Controller MCT, interrupts the operation of the  
equipment, exhibits the corresponding message, opens the deflating  
valve and activates the Alarm every time the same error, failure

or discrepancy occurs for three consecutive times upon performing an operation or function.

37. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 5 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35 and 36 characterized by the fact that the Microchip Controller MCT interrupts the operation of the equipment, exhibits the corresponding message, opens the deflating valve and activates the Alarm, every time any key is pressed 10 during the operation.

38. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36 and 37 characterized by the use of a three-way solenoid 15 valve which when turned off deviates the air to the atmosphere, to allow the compressor to operate continuously, freely and without heating.

39. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 20 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37 and 38 characterized by the fact that the MCT exhibits the complete totals of all those items used as well as the totals of failures presented.

40. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38 and 39 characterized by the fact that the Microchip Controller MCT commands the procedures to turns on the compressor, such as deflating the line, and checking of the 30 compressor minimal internal pressure to liberate its use. In case the system does not reach this minimal internal pressure the message "OUT OF SERVICE" appears on the display.

41. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 35 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39 and 40 characterized by being able to exhibit constantly on the display

the current time and the remaining usage time allowed after liberation or payment of the service, turning off the whole system once this time is elapsed.

42. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40 and 41 characterized by the fact that the equipment can be equipped with an air-retention tip as a replacement of the functions of those routines connected to an empty tire.

43. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41 and 42 characterized by the fact that the equipment only goes back to operation after the introduction of a new password issued by the equipment owner.

44. Electronic circuit for electro-pneumatic calibrator according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42 and 43 characterized by the fact that during the process of inflating is made a check to ensure there is enough pressure in the air line.